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Original Article

Differential Cardiometabolic Effects of GLP-1 Receptor Agonists Versus SGLT2 Inhibitors in Early-Onset Type 2 Diabetes: A Randomized Controlled Trial

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ABSTRACT

Introduction: Early-onset type 2 diabetes mellitus is characterized by higher exposure to cardiometabolic risk throughout life and increased risk of cardiovascular morbidity. GLP-1 receptor agonists and SGLT2 inhibitors improve the markers of cardiometabolic risk; however, a comparison between the therapies is poorly represented in the literature regarding younger population. Objective: Comparative study of the short-term effects of GLP-1 receptor agonist and SGLT2 inhibitor therapy on the markers of cardiometabolic risk in patients with early-onset type 2 diabetes mellitus. Methods: A randomized parallel group clinical trial was conducted in 84 patients with early-onset type 2 diabetes mellitus. Patients were randomized to receive once weekly GLP-1 receptor agonist therapy or once daily SGLT2 inhibitor therapy for 6 weeks. Main outcomes were changes in systolic blood pressure (SBP), diastolic blood pressure (DBP) and lipid profile. Secondary outcomes were BMI, HbA1c, fasting glucose, and frequency of treatment discontinuation due to adverse events. Results: 79 patients completed follow up and were included into available case analysis. Post-intervention SBP and DBP values were lower in SGLT2 inhibitor group in comparison with GLP-1 receptor agonist group. LDL-C values were lower in GLP-1 receptor agonist group. Mean reduction in SBP value was 8.9 ± 3.1 mmHg in GLP-1RA group vs 10.8 ± 3.5 mmHg in SGLT2 inhibitor group. Mean reduction in LDL-C level was 18.5 ± 6.2 mg/dL in GLP-1RA group and 9.2 ± 5.8 mg/dL in SGLT2 inhibitor group. Conclusion: Both therapeutic interventions led to short-term improvement of the cardiometabolic risk markers in patients with early-onset type 2 diabetes with different beneficial effects of SGLT2 inhibitors on blood pressure reduction and GLP-1RA on LDL-C level reduction. Key words: Cardiovascular Risk Markers, Early-Onset Diabetes, GLP-1 Receptor Agonists, Glycated Hemoglobin, Lipid Profile, SGLT2 Inhibitors, Type 2 Diabetes Mellitus.

EDITORIAL INFORMATION

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INTRODUCTION

Cardiovascular diseases constitute the primary morbidity and mortality risk for patients with type 2 diabetes mellitus, especially in those developing the condition at an early age. The term early-onset type 2 diabetes refers to a diagnosis before the age of 40, and such condition is characterized by long-lasting

exposure to high blood sugar levels, increased cardiovascular burden and risks, earlier onset of complications, and accelerated progression compared with late-onset type 2 diabetes (1). Early-onset type 2 diabetes usually develops in conjunction with other comorbidities, such as obesity, insulin resistance, dyslipidemia, hypertension, and increased speed of metabolism dysfunction development (2).

The paradigm of treatment of type 2 diabetes has changed greatly from glucose-centric to cardiometabolic management. There are several drug categories used today for the effective treatment of type 2 diabetes, such as glucagon-like peptide-1 receptor agonists and sodium-glucose cotransporter 2 inhibitors, which have proven their efficiency in terms of glycemia, body weight, cardiovascular protection, and renal outcomes (3). GLP-1 receptor agonists act by improving glucose tolerance through incretin-induced effects of insulin stimulation, glucagon inhibition, gastric emptying delay, and appetite reduction (4). In addition, these drugs affect body weight, inflammation, endothelial function, and atherosclerotic risk factors. The data from large cardiovascular outcome trials suggest that GLP-1 receptor agonists reduce atherosclerotic cardiovascular events in patients with type 2 diabetes and high cardiovascular risk (5).

SGLT2 inhibitors utilize an alternative non-insulin dependent renal pathway which reduces glucose absorption in the proximal tubules, leads to glycosuria, and results in better glycemic control in addition to having an effect on weight, blood pressure, renal hemodynamics, and cardiac loading conditions (6). The positive cardiovascular and renal effects of SGLT2 inhibitors have been consistently attributed to osmotic diuresis, natriuresis, reduction in plasma volume, ventricular loading improvement, and influence on intraglomerular pressure (7).

Despite the fact that both pharmacological agents are integral elements of contemporary diabetes treatment, there is no direct comparison between them in adults with early onset type 2 diabetes. Indeed, majority of the outcome studies have consisted mainly of middle aged or elderly people, while younger adults have been significantly underrepresented in spite of a longer period of time spent in the condition and the presence of considerable accumulated cardiovascular risk (8). This is a very relevant issue because treatment priorities in early-onset condition can differ from those in the older age group; in younger patients more complex therapeutic approaches targeting glycemia, blood pressure, lipid load, weight, compliance, tolerability, and prevention of vascular complications in the long run are needed (9).

There is evidence that GLP-1 receptor agonists and SGLT2 inhibitors have class-specific mechanisms of cardiometabolic action. For example, GLP-1 receptor agonists can be more useful in the case of weight loss and modification of atherosclerotic risk, while SGLT2 inhibitors can have a more pronounced effect on blood pressure, volume status, heart failure risk, and renal effects (10). Whether these class-specific effects result in differences in short-term cardiometabolic risk marker changes in adults with early onset type 2 diabetes is unknown. Specifically, comparisons of blood pressure, lipids, glycemia, and BMI in younger adults with early onset type 2 diabetes are not sufficiently defined.

For this reason, a randomized controlled trial was done in order to evaluate the short-term effects of GLP-1 receptor agonists and SGLT2 inhibitors on cardiometabolic risk factors in adults with type 2 diabetes diagnosed at less than 40 years of age. The main aim of the study was to evaluate the changes in systolic blood pressure, diastolic blood pressure, and lipids after six weeks of therapy, while the other aims of the study were to evaluate the changes in HbA1c, fasting blood glucose, body mass index, and treatment adverse events. The study sought to evaluate the effectiveness of the two drugs and their differential effects on blood pressure and lipids (11).

MATERIALS AND METHODS

This is a parallel-group randomized controlled trial among adult patients with early onset type 2 diabetes mellitus in the Industrial and Urban Core Punjab region. The aim of this study is to compare the short-term cardiometabolic effect of GLP-1 receptor agonists and SGLT2 inhibitors on patients over a six-week period of treatment intervention. The study population will be recruited from the outpatient endocrinology clinics between December 2025 and February 2026. Inclusion criteria will include patients aged adults that have been diagnosed with type 2 diabetes before attaining the age of 40 years, having a documented duration of

the disease of more than one year and whose glycemic status has been stable for the past three months. Excluded patients will include those with a cardiovascular event in the past six months, advanced renal disease, active liver disease, pregnancy, concurrent administration of both drug types and those having contraindications for the interventions.

Patients were identified through medical history and baseline evaluation, after which eligibility is assessed. Following confirmation of eligibility, informed consent is sought prior to enrollment into the study. Eighty-four participants were randomized in a 1:1 allocation ratio to either the GLP-1 receptor agonist group or SGLT2 inhibitor group. The randomization was based on computer generated random sequence and allocation concealment was done through preparation of opaque, sealed, sequentially numbered envelopes prepared independently by a researcher not involved in the conduct of the recruitment, treatment, evaluation of outcomes and analysis of the results. Due to the varied methods of administration of the two drugs, blinding of the participant and the treating-clinician was not possible, but the assessors and the analysts were blinded to the allocations.

Patients in the GLP-1 receptor agonist group were administered with GLP-1 receptor agonist once per week through subcutaneous injection along with conventional diabetes management care. Patients in the SGLT2 inhibitor group were administered with SGLT2 inhibitor once per day through oral administration in addition to conventional diabetes management care. Conventional diabetes management care involved dietary advice, continuation of baseline diabetic therapy where clinically indicated, and exclusion of other therapies except that of the treatment assigned where patients would take no other incretin based drugs or SGLT2 inhibitors other than those prescribed. Stable lifestyles were to be maintained throughout the intervention process in order to minimize any behavioral influences on outcomes.

Systolic blood pressure, diastolic blood pressure, and serum lipid profile changes from baseline to the end of six weeks of intervention constituted primary outcomes. Measurements of systolic blood pressure and diastolic blood pressure were made with the use of a calibrated sphygmomanometer. Measurement of lipid profile was made through assessment of low density lipoprotein cholesterol. Secondary outcomes included changes in HbA1c, fasting blood glucose, body mass index, and adverse reactions to treatment. Calculations of body mass index were made through measured body mass and height. Glycemic and biochemical measurements were done using the same protocol for both interventions.

The possible biases were controlled by means of randomization, allocation concealment, blinded outcome assessment, blinded data analysis, standardized outcome measurement and equivalent follow-up procedures in both groups. Baseline characteristics were collected in order to check the comparability of the groups after randomization. They include age, gender, body mass index, HbA1c, systolic blood pressure, low-density lipoprotein cholesterol. Subjects lost to follow-up were accounted and the reason of their withdrawal from the study stated. The analysis population was determined depending on the availability of the outcome measures data after the intervention.

Descriptive and inferential statistics were utilized for the analysis of the data. Continuous variables were described as mean ± standard deviation, while categorical ones – as frequencies and percentages. The normality of continuous variables was checked by the Shapiro–Wilk test. Baseline comparisons between the groups were conducted with the help of independent-samples t-tests for continuous variables and corresponding categorical tests for frequency measures. Within-group differences pre- and post-intervention were checked by means of paired-samples t-tests. Differences between the groups in post-intervention outcomes and their changes were analyzed via independent-samples t-tests and repeated-measures analysis of variance including analysis of the time, group and interaction effects. The relationships between metabolic improvement and cardiovascular risk factors were studied by means of Pearson correlation analysis. The results were regarded as significant at a p-value < 0.05.

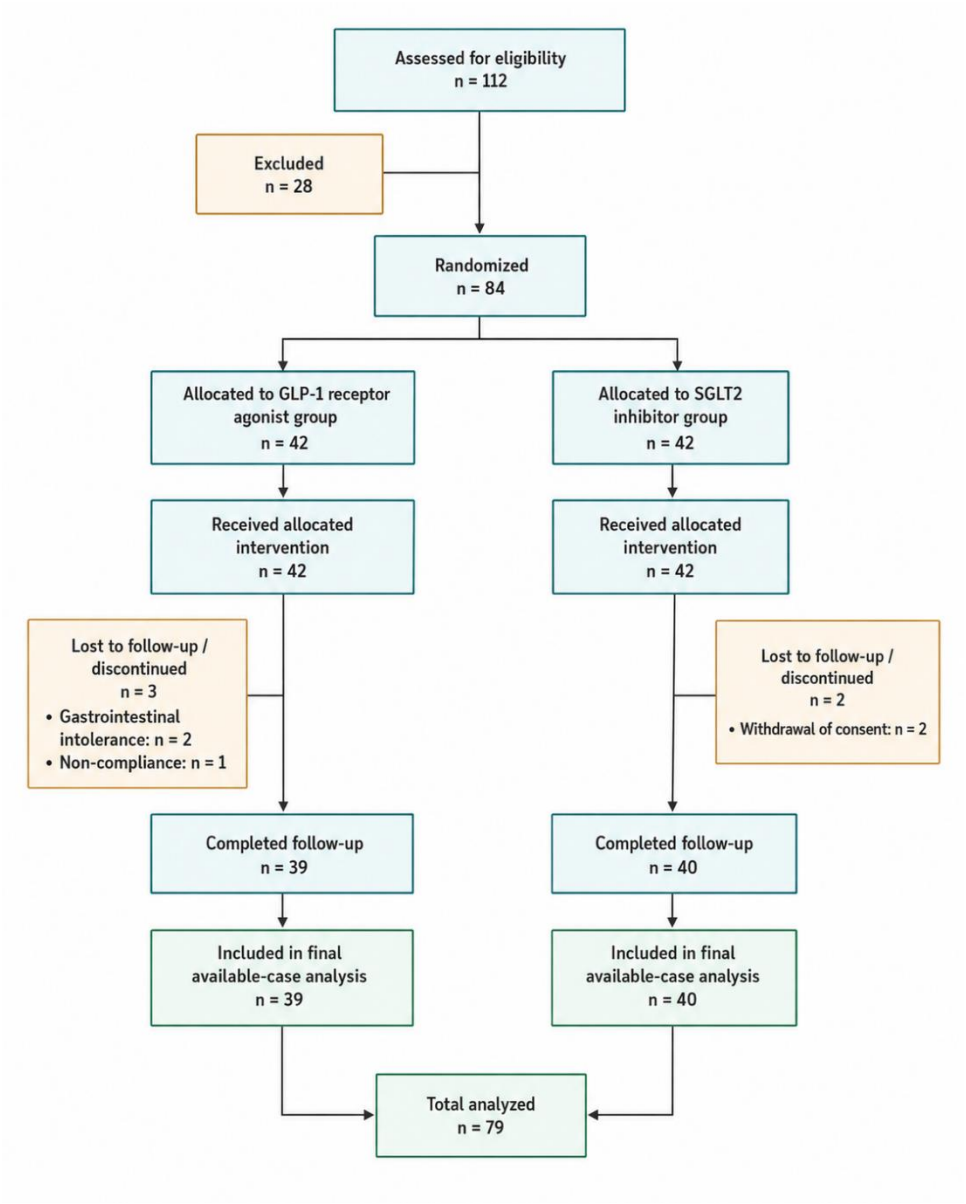

Figure 1 CONSORT Flowchart

The study was conducted in accordance with ethical principles for human participant research. Participants provided informed consent before enrollment, and confidentiality of clinical and laboratory data was maintained throughout data collection, analysis, and reporting. Data were checked for completeness, consistency, and range errors before analysis to support reproducibility and data integrity.

RESULTS

In total, 112 patients were assessed for eligibility, out of which 84 satisfied the inclusion criteria and were randomly allocated to GLP-1 receptor agonist group and SGLT2 inhibitor group. During the 6-week intervention period, five subjects failed to be followed up, three in GLP-1 receptor agonist group and two in SGLT2 inhibitor group. The final available-case analysis involved 79 subjects, with 39 in GLP-1 receptor agonist group and 40 in SGLT2 inhibitor group.

Among the 84 randomized subjects, 79 underwent the post-intervention evaluation and were included in the final available-case analysis. Dropout rates were numerically higher in GLP-1 receptor agonist group compared to the SGLT2 inhibitor group. Gastrointestinal intolerance contributed to two withdrawals in GLP-1 receptor agonist group, while withdrawal of consent was observed in both cases in the SGLT2 inhibitor group.

Demographic and clinical baseline characteristics did not differ between groups. Age in GLP-1 receptor agonist group was 36.5 ± 3.6 years; while in SGLT2 inhibitor group, it was 35.9 ± 4.0 years. Male proportion was equal in both groups, as there were 23 males in both groups. Baseline BMI, HbA1c, SBP, and LDL-C did not differ between groups (all baseline p > 0.05).

Table 1. Participant Flow from Screening to Final Analysis

Study Stage	Total, n	GLP-1RA, n	SGLT2 Inhibitor, n
Screened for eligibility	112	—	—
Randomized	84	42	42
Lost to follow-up	5	3	2
Gastrointestinal intolerance	2	2	0
Non-compliance	1	1	0
Withdrawal of consent	2	0	2
Included in final analysis	79	39	40

GLP-1RA: glucagon-like peptide-1 receptor agonist; SGLT2: sodium–glucose cotransporter 2.

Table 2. Baseline Demographic and Clinical Characteristics of Randomized Participants

Variable	Total Sample, N=84	GLP-1RA, n=42	SGLT2 Inhibitor, n=42	p-value
Age, years, Mean ± SD	36.2 ± 3.8	36.5 ± 3.6	35.9 ± 4.0	0.48
Male, n (%)	46 (54.8)	23 (54.8)	23 (54.8)	1.00
BMI, kg/m^2, Mean ± SD	29.1 ± 2.9	29.3 ± 3.1	28.9 ± 2.7	0.56
HbA1c, %, Mean ± SD	8.6 ± 0.9	8.7 ± 1.0	8.5 ± 0.8	0.39
SBP, mmHg, Mean ± SD	134.5 ± 8.2	135.1 ± 8.5	133.9 ± 7.9	0.47
LDL-C, mg/dL, Mean ± SD	132.4 ± 18.6	133.8 ± 19.2	131.0 ± 17.9	0.52

BMI: body mass index; HbA1c: glycated hemoglobin; LDL-C: low-density lipoprotein cholesterol; SBP: systolic blood pressure.

Table 3. Post-Intervention Primary Cardiometabolic Outcomes in the Final Analysis Sample

Outcome	GLP-1RA, n=39, Mean ± SD	SGLT2 Inhibitor, n=40, Mean ± SD	Mean Difference	95% CI	p-value
SBP, mmHg	126.2 ± 7.4	123.1 ± 6.9	3.1	0.2 to 6.0	0.036
DBP, mmHg	79.8 ± 5.1	77.2 ± 4.8	2.6	0.4 to 4.8	0.021
LDL-C, mg/dL	115.3 ± 15.2	121.8 ± 16.0	-6.5	-12.8 to -0.2	0.043

DBP: diastolic blood pressure; LDL-C: low-density lipoprotein cholesterol; SBP: systolic blood pressure.

At six weeks, post-intervention systolic and diastolic blood pressure values were lower in the SGLT2 inhibitor group than in the GLP-1 receptor agonist group. Mean SBP was 123.1 ± 6.9 mmHg in the SGLT2 inhibitor group compared with 126.2 ± 7.4 mmHg in the GLP-1 receptor agonist group, with a between-group mean difference of 3.1 mmHg. Mean DBP was 77.2 ± 4.8 mmHg in the SGLT2 inhibitor group and 79.8 ± 5.1 mmHg in the GLP-1 receptor agonist group. In contrast, LDL-C was lower in the GLP-1 receptor agonist group, with a mean value of 115.3 ± 15.2 mg/dL compared with 121.8 ± 16.0 mg/dL in the SGLT2 inhibitor group.

Table 4. Within-Group Pre–Post Changes in Reported Primary Outcomes

Outcome	Group	Baseline, Mean ± SD	Post-Intervention, Mean ± SD	Mean Change, Mean ± SD	p-value
SBP, mmHg	GLP-1RA	135.1 ± 8.5	126.2 ± 7.4	-8.9 ± 3.1	<0.001
SBP, mmHg	SGLT2 Inhibitor	133.9 ± 7.9	123.1 ± 6.9	-10.8 ± 3.5	<0.001
LDL-C, mg/dL	GLP-1RA	133.8 ± 19.2	115.3 ± 15.2	-18.5 ± 6.2	<0.001
LDL-C, mg/dL	SGLT2 Inhibitor	131.0 ± 17.9	121.8 ± 16.0	-9.2 ± 5.8	<0.001

LDL-C: low-density lipoprotein cholesterol; SBP: systolic blood pressure.

Within-group analyses revealed significant decreases in SBP and LDL-C in each intervention group. There was a decrease in SBP of 8.9 ± 3.1 mmHg in the GLP-1RA group and 10.8 ± 3.5 mmHg in the SGLT2 inhibitor group. There was also a decrease in LDL-C of 18.5 ± 6.2 mg/dL in the GLP-1RA group and 9.2 ± 5.8 mg/dL in the SGLT2 inhibitor group. These results reveal that there is a higher reported blood pressure reduction with SGLT2 inhibitor and a higher LDL-C reduction with GLP-1 receptor agonist.

Figure reveals the six-week cardiometabolic response profile for adults with early-onset type 2 diabetes under GLP-1 receptor agonist or SGLT2 inhibitor therapy. Figure A demonstrates the reported absolute reduction in systolic blood pressure and LDL-C, with higher SBP reduction observed with SGLT2 inhibitor

therapy and higher LDL-C reduction with GLP-1RA therapy. Figure B displays the post-intervention between-group mean difference with 95% confidence interval for SBP, DBP, and LDL-C. Figure C illustrates the comparison of secondary post-intervention outcomes, such as BMI, HbA1c, and fasting glucose. Figure D represents participant flow and reasons for discontinuation and provides the final available-case analysis of 79 out of 84 randomized participants.

Table 5. Secondary Outcomes at Six-Week Follow-Up in the Final Analysis Sample

Outcome	GLP-1RA, Mean ± SD	SGLT2 Inhibitor, Mean ± SD	p-value
BMI, kg/m^2	27.8 ± 2.6	28.1 ± 2.5	0.42
HbA1c, %	7.4 ± 0.7	7.6 ± 0.6	0.18
Fasting glucose, mg/dL	134.2 ± 18.5	129.8 ± 17.9	0.29

BMI: body mass index; HbA1c: glycated hemoglobin.

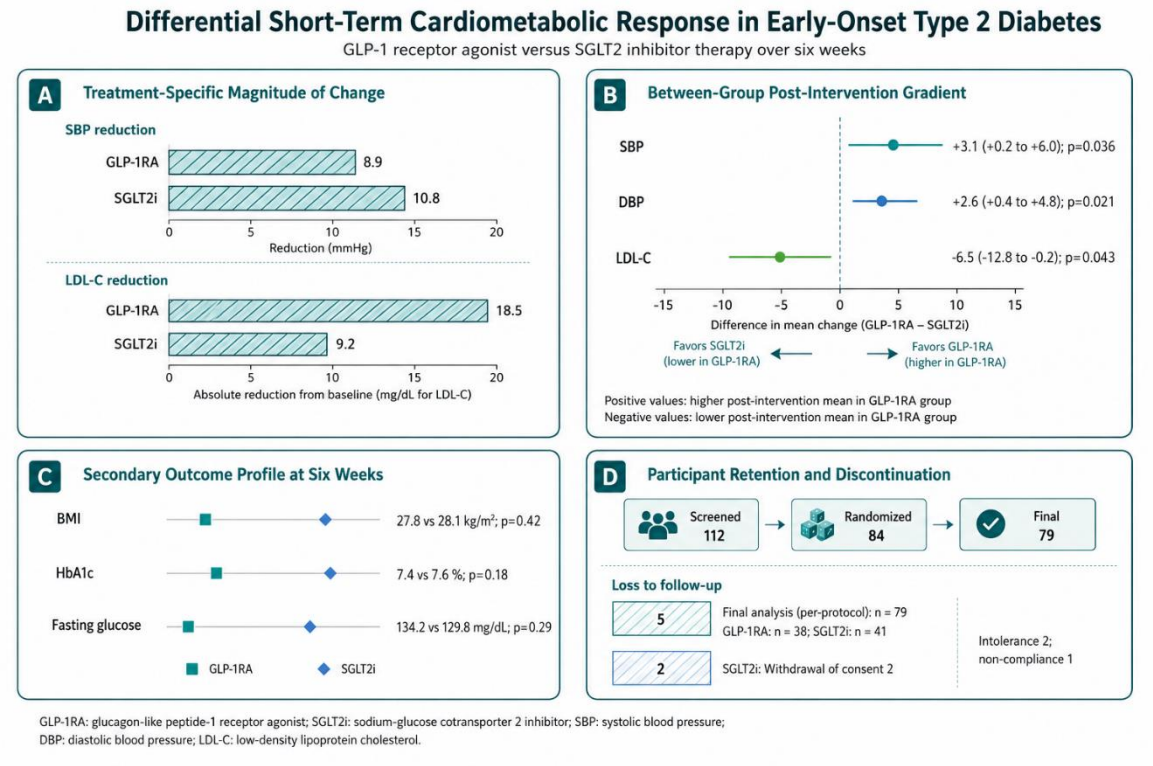

Figure 2 Differential Short-Term Cardiometabolic Response in Early-Onset Type 2 Diabetes

Secondary outcomes of metabolism at 6-week follow-up revealed similar post-intervention results. In the GLP-1 receptor agonist group, BMI was 27.8 ± 2.6 kg/m^2 and in the SGLT2 inhibitor group, BMI was 28.1 ± 2.5 kg/m^2. HbA1c in the GLP-1 receptor agonist group was 7.4 ± 0.7% and in the SGLT2 inhibitor group, HbA1c was 7.6 ± 0.6%. There were numerically lower fasting glucose levels in the SGLT2 inhibitor group, where the mean value was 129.8 ± 17.9 mg/dL compared with 134.2 ± 18.5 mg/dL in the GLP-1 receptor agonist group (p=0.29).

Repeated measures analysis of variance revealed the presence of time effect, group effect and interaction effect of time and group on the treatment response. The reported F value for time effect was 112.4 ($p<0.001$), for group effect – 5.9 (p=0.017), and for time by group interaction – 6.8 (p=0.011). Interaction is an indication that the patterns of changes were different in the treatment groups but outcome specific repeated measures results were not provided in the manuscript and should be provided separately for SBP, DBP, LDL-C, BMI, HbA1c, and fasting glucose.

The results of Pearson correlation test showed the presence of moderate positive correlation between the reduction in HbA1c and reduction in LDL-C with r=0.42 (p=0.002). That means that the more pronounced HbA1c improvement was associated with more pronounced LDL-C improvement in the analyzed sample, while treatment-stratified estimates or adjusted correlation analysis cannot be done based on the supplied data.

DISCUSSION

The randomized controlled trial under discussion demonstrated the presence of some short-term beneficial effects of GLP-1 receptor agonist and SGLT2 inhibitor therapy on selected cardiometabolic risk markers in patients with early-onset type 2 diabetes. The specific pattern of response to these therapeutic interventions was different between the treatment groups. More pronounced reductions of systolic and diastolic blood pressure were seen in case of the use of SGLT2 inhibitor therapy, whereas greater reduction of LDL-C was achieved during GLP-1 receptor agonist therapy. These findings corroborate the idea that the two drug classes may have complementary cardiometabolic effects; however, the current study evaluated intermediate risk markers for 6 weeks instead of cardiovascular endpoints like myocardial infarction, stroke, heart failure hospitalization, or cardiovascular mortality (12).

The greater blood pressure reduction observed in the SGLT2 inhibitor group can be explained by the biological mechanisms related to this kind of therapy. SGLT2 inhibitors promote glycosuria, osmotic diuresis, natriuresis, and moderate plasma volume contraction. All these mechanisms have the potential to decrease the vascular load and lead to blood pressure reduction. It has already been shown previously in other clinical studies that SGLT2 inhibition had favorable effects on blood pressure, volume status, cardiorenal physiology, and heart failure risk markers; however, the current trial was not designed and powered for assessment of heart failure (13,14). On the contrary, greater LDL-C reduction in the GLP-1 receptor agonist group can be considered as a better short-term effect of the therapy on atherosclerotic risk markers in terms of lipid profile. GLP-1 receptor agonists affect appetite control, weight-related metabolism, insulin sensitivity, endothelial function, and inflammation. These features of their effects might have contributed to the observed results. Nevertheless, despite the cardiovascular outcome literature, which highlighted the role of GLP-1 receptor agonists in reduction of atherosclerotic events, it is necessary to consider the current findings as evidence of better lipid profile rather than as evidence of reduced cardiovascular events (15,16).

BMI, HbA1c, and fasting glucose levels showed no substantial differences between groups at follow-up after 6 weeks. Although both drug classes are expected to provide an improvement in glycemic indices, the short follow-up period may have hindered the detection of greater between-groups difference in HbA1c and body mass index. HbA1c represents the effect of glycemic control during several weeks to months; hence, more robust treatment effect can be observed only during longer follow-up periods. The moderate positive correlation of changes in HbA1c and LDL-C indicates a possibility for improvement in both glycemic and lipid indices, which however must be viewed cautiously because no adjusted models and correlations stratified by treatment groups were provided (17).

Practical significance of the results can be seen in a differential cardiometabolic profile rather than superiority of a certain drug group. Long-term exposure to hyperglycemia, dyslipidemia, hypertension, and obesity in adults with early-onset type 2 diabetes increases the cumulative vascular risk in this patient category. Thus, treatment choice may reasonably take into account the dominant risk phenotype. Patients having elevated blood pressure or volume-related cardiorenal vulnerability may gain more benefit regarding risk marker improvement with SGLT2 inhibitor treatment, while lipid-related or atherogenic risk burden in a patient makes GLP-1 receptor agonists preferable. However, individualized drug treatment should be considered in connection with clinical guidelines, patient preferences, route of administration, contraindication, price, renal function, tolerability, and outcome studies (18). Strengths of this study include its randomization that decreased bias and comparable baseline demographic and clinical characteristics of groups. The allocation concealment and blinding of outcomes improved internal validity, even though blinding patients and treating physicians was impossible due to the different routes of medication administration. Moreover, the focus on early-onset type 2 diabetes helped to address an important patient population that was underrepresented in other cardiovascular outcomes trials of glucose-lowering drugs (19).

There are some limitations worth noting. For one, the intervention period spanned only six weeks, which is sufficient to detect changes in blood pressure and certain biochemical markers but not enough to assess long-term cardiometabolic and clinical cardiovascular effects. Furthermore, the sample used comprised

79 out of 84 randomized patients, which represents an available case analysis and not an intention-to-treat one unless the missing observations are accounted for in a sensitivity analysis. In addition, information on the names, dosages, titration schedules, and criteria for drug adherence should be provided for complete reproducibility of results. Moreover, the adverse events are only partially explained by reasons of treatment discontinuation, and an adverse event table must be provided for making any reliable statements about safety. Lastly, the single-region design may pose generalizability problems due to differences in genetics, socioeconomic status, nutrition, and healthcare access between the examined and other populations (20).

Thus, the research provides useful data regarding the comparative effects of GLP-1 receptor agonists and SGLT2 inhibitors on different cardiometabolic risk factors in adults with early-onset type 2 diabetes.

CONCLUSION

In adults suffering from early-onset type 2 diabetes, both the GLP-1 receptor agonists and the SGLT2 inhibitors demonstrated improvements in certain cardiometabolic risks after six weeks. The SGLT2 inhibitors showed more reductions in systolic and diastolic blood pressure, while the GLP-1 receptor agonists showed more reductions in LDL-C levels. This implies that depending on the cardiometabolic risks, one can determine which drug to administer; for instance, where the patient has hypertension compared to lipid profile risk. However, caution is advised since this study was based on assessing surrogate risk markers after a very short period of time and there is no indication of any cardiovascular events.

REFERENCES

1. Pardo IS. On cardiovascular complications in people with type 2 diabetes: aspects of incretin-based therapy and glycemic control. Karolinska Institutet (Sweden); 2024.
2. Chiang C-E, Wang K-L, Cheng H-M, Chao T-F, Sung S-H. Incretin-based therapy: an update focusing on the major revolution in cardiovascular-kidney-metabolic health. J Chin Med Assoc. 2025;88(8):585-593.
3. Avogaro A. Beyond glycemic control: how incretins are changing the cardiovascular trajectories of diabetes and obesity. Eur J Clin Invest. 2026;56(2):e70184.
4. Caruso I, Cignarelli A, Sorice GP, Perrini S, Giorgino F. Incretin-based therapies for the treatment of obesity-related diseases. nMH Disease. 2024;2(1):31.
5. Miramontes-González JP, Rodrigo-Alaíz Á, Gabella-Martín M, González-Calle D, Carretero-Gómez J, Corral-Gudino L. Rewriting diabetes therapy: how incretin modulation is transforming cardiovascular and renal outcomes. Diabetes Ther. 2026:1-14.
6. Janez A, Muzurovic E, Bogdanski P, Czupryniak L, Fabryova L, Fras Z, et al. Modern management of cardiometabolic continuum: from overweight/obesity to prediabetes/type 2 diabetes mellitus. Recommendations from the Eastern and Southern Europe diabetes and obesity expert group. 2024;15(9):1865-1892.
7. Howse PM. Incretin-based therapies in patients with type 2 diabetes mellitus and renal impairment. Memorial University of Newfoundland; 2023.
8. Alluri AA, Guntupalli Y, Suvarna SS, Prystupa Y, Khetan SP, Vejandla B, et al. Incretin-based therapies: advancements, challenges, and future directions in type 2 diabetes management. 2025;36(2-3):95-111.
9. Psaltis JP, Marathe JA, Nguyen MT, Le R, Bursill CA, Marathe CS, et al. Incretin-based therapies for the management of cardiometabolic disease in the clinic: past, present, and future. 2025;45(1):29-65.
10. Lee AA, Khotina VA, Kashirskikh DA, Voronko OE, Gasanov VA, Vasiliev AV. Incretin-based therapies through the decades: molecular innovations and clinical impact. Med Sci. 2025;13(4):269.

11. Medenica S, Prelević V, Zanković N, Maggio V, Rizzo M. Cardiorenometabolic medicine as a new subspecialty in the light of novel pharmaceuticals with dual or triple benefits. Expert Opin Drug Saf. 2026; just accepted.

12. Steven S, Kuntic M, Münzel T, Daiber A. Modern antidiabetic therapy by sodium-glucose cotransporter 2 inhibitors, glucagon-like peptide 1 receptor agonists, and dipeptidyl peptidase 4 inhibitors against cardiovascular diseases. Pharmacol Res. 2025;77(5):100082.

13. Muzurović EM, Volčanšek Š, Tomšić KZ, Janež A, Mikhailidis DP, Rizzo M, et al. Glucagon-like peptide-1 receptor agonists and dual glucose-dependent insulinotropic polypeptide/glucagon-like peptide-1 receptor agonists in the treatment of obesity/metabolic syndrome, prediabetes/diabetes and non-alcoholic fatty liver disease: current evidence. 2022;27:10742484221146371.

14. Alanezi AA. The role of pharmacological interventions in optimizing glycemic control and reducing complications in diabetes mellitus: current insights and future directions. 2025;20(1):98-106.

15. Pop AS, Dănilă MD, Giuchici S, Buriman DG, Lolescu BM, Sturza A, et al. Epicardial adipose tissue as target of the incretin-based therapies in cardio-metabolic pathologies: a narrative review. 2025;103(6):182-192.

16. Janez A, Muzurovic E, Bogdanski P, Czupryniak L, Fabryova L, Fras Z, et al. Modern management of cardiometabolic continuum. 2024.

17. Florescu A, Pucerea S, Floria M, Rusu E, Cuiban E, Jinga M, et al. Targeting heart disease in cardiovascular–kidney–metabolic syndrome: a review of novel therapeutic approaches with prognostic and quality-of-life impact. 2025;128(6):554-565.

18. Fortin E. Novel biomarkers in cardiovascular disease and dysglycaemia. Karolinska Institutet; 2025.

19. Xanthopoulou M, Evangelidis P, Poulis D, Gavriilaki E, Kotsiou N, Antza C, et al. Glucagon-like peptide-1 receptor agonists and platelet function: potential benefits beyond glycemic control. 2026;19(3):462.

20. Wang X, Yang X, Qi X, Fan G, Zhou L, Peng Z, et al. Anti-atherosclerotic effect of incretin receptor agonists. 2024;15:1463547.